

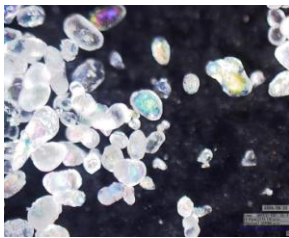
Christmas comes early for explosives lab

Christmas came early for the McAlester Army Ammunition Plant explosives laboratory employees in the form of a digital microscope accompanied by a lap top, key board and central processing unit. This enabled them to enter the digital age in microscopic analysis.

The smaller of the two scopes lenses has a magnification capability from 20 to 320 times while the larger scope can magnify from 140 to 7,000 times. The smaller one is portable and comes with a hand-held adapter which can magnify up to 160 times. The maximum magnification with their original microscopes was 400 times.

Already the \$37,000 equipment has more than paid for itself, said Tim McCullough, physical scientist at the plant's explosive lab.

McCullough was presented with a product that contained rust underneath a polyurethane seal. Whether it was 'active' rust (which could spread) or 'dead' rust (which could not spread), would determine whether the production line began as scheduled or be delayed from six months to a year.



Using the larger scope and a magnification level of 420 times, McCullough was quickly able to determine that the rust was inactive . . . dead.

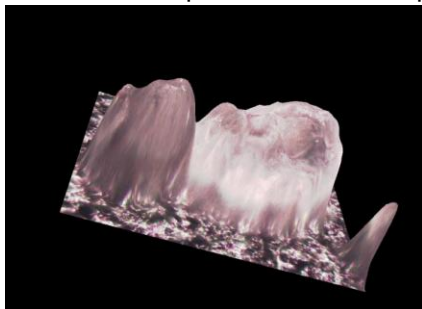
"If we couldn't have proven that the rust was 'dead' we wouldn't have been able to begin that production line and new components would have had to be ordered or existing

ones reconditioned. Either way it could have taken six months or a year to re-start the line," he said.

With the introduction of new generations of insensitive munitions using plastic bonded explosives, the digital microscopes greatly enhance the plant's ability to analyze their own powder-based explosives, said Brad Black, chief of quality assurance testing.

"Insensitive munitions are more stable when there are no voids between the powder-based particles. With the digital scope, we can determine if there is a void in the powder-based explosive that needs to be corrected," he said. Having

voids between particles makes the explosive more shock and friction sensitive, Black explained.



An advantage of a portable digital scope with a hand-held adapter is that it can take measurements in confined spaces that a normal caliper could not reach like it did on a Harpoon fuze well, McCullough said. The digital scope can measure down to one micron which is equivalent to 0.000039 inches or 39 millionths of an inch.

To understand the magnification capability of the new digital scopes, Treaver Price, chemist, collected rain water and deposited one drop from an eye dropper on a slide. Under examination at 400 times magnification he found a microscopic worm and took a 30-second video of its movement.

A lot of 'customer unique problems' can be resolved with these digital scopes, Black said. "If there are unique things people need to get a better look at we can sure help them out."

Details—A microscopic worm was discovered in the rain water of one drop of an eye dropper by lab technicians using their new digital microscope. The maximum magnification of the plant's older microscopes was 400 times. Maximum magnification for the digital microscope is 7,000 times. (Submitted photo)



Magnification—Tim McCullough, physical scientist, uses a hand-held adapter which is part of the lab's new portable electronic microscope, to enlarge the lettering on an object. One of the two scopes' maximum magnification level is 7,000 times. (U.S. Army photo by Mark Hughes)

3-D technology—At left is a 2D photograph of ammonium perchlorate crystals. Above is a 3D photograph of the same crystals using the new digital microscope. (Submitted photos)